

RECLAMATION

Managing Water in the West

Elephant Butte Reservoir Delta Photostations

2005-2009



U.S. Department of the Interior
Bureau of Reclamation
Fisheries and Wildlife Resources
Denver, Colorado

February 2010

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Elephant Butte Reservoir Delta Photostations

2005-2009

prepared for

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Introduction

In August 2005, thirteen photo stations were established to visually document the development of woody vegetation within Elephant Butte Reservoir (Figures 1 through 3). From 1995 to 2004, Elephant Butte Reservoir steadily receded, with reservoir elevations dropping over 100 feet, equating to 1.7 million acre feet in volume and exposing nearly 20 miles of previously inundated reservoir. From 2004 to 2009, reservoir elevations have fluctuated approximately 50 ft in depth, within a 3 mile zone in distance, and 500,000 acre feet in volume.

Native and non-native vegetation quickly established in the exposed soils as the reservoir receded. This new and developing habitat became inhabited by a wide variety of mammalian, herpetofauna, and avian wildlife species; including the endangered Southwestern Willow Flycatcher (SWFL) (*Empidonax traillii extimus*) and the Yellow-billed Cuckoo (YBCU) (*Coccyzus americanus occidentalis*), a Federally listed candidate species.

With the reservoir receding over an eight year period (1995-2004), various age classes of vegetation established and continue to develop and change in composition, structure, and density. The photo stations are intended to provide a visual documentation of these changes.

Overview of Individual Photo Stations

The UTM coordinates, and compass bearings of each photo are identified in Appendix A. As shown in the photos (Appendix B), most changes over the past four years are self explanatory. However, the following section expands on the somewhat obvious, and briefly discusses each station and the changes in vegetation that have occurred over the past four years.

Station DL-07 is located near the end of Dryland Road. In the foreground is the primary watercourse from the Low Flow Conveyance Channel (LFCC). In this reach the LFCC flows are uncontained and typically spread-out over a large area. Photos were taken at 80° and 150° from the established t-post station.

80° Photos – The photos show the development of coyote willow (*Salix exigua*) in the transition zone between cattail (*Typha* spp) marsh and Gooddings willow (*Salix gooddingii*) in the background. The Goodding's willow provides suitable SWFL breeding habitat which has been occupied for the past several years. Overall the vegetation has not experienced major changes over the past four year period. This is likely due to the relatively persistent flows from the LFCC present in the foreground.

150° Photos – These photos taken of the downstream channel show very little change in vegetation over the past four years. As previously mentioned, this is likely due to the relatively persistent flows from the LFCC.

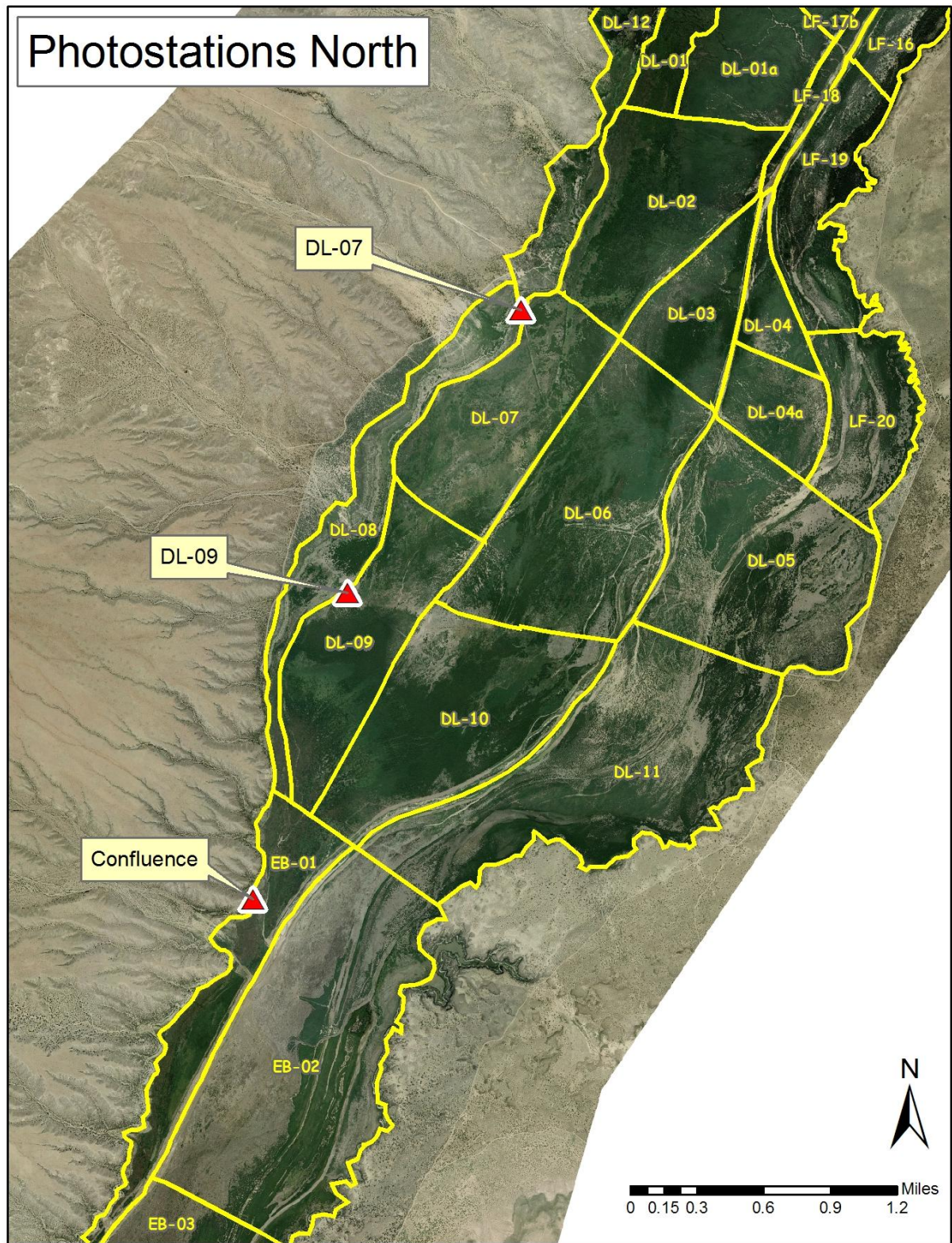


Figure 1. Northern section of photostations in Elephant Butte Reservoir Delta.

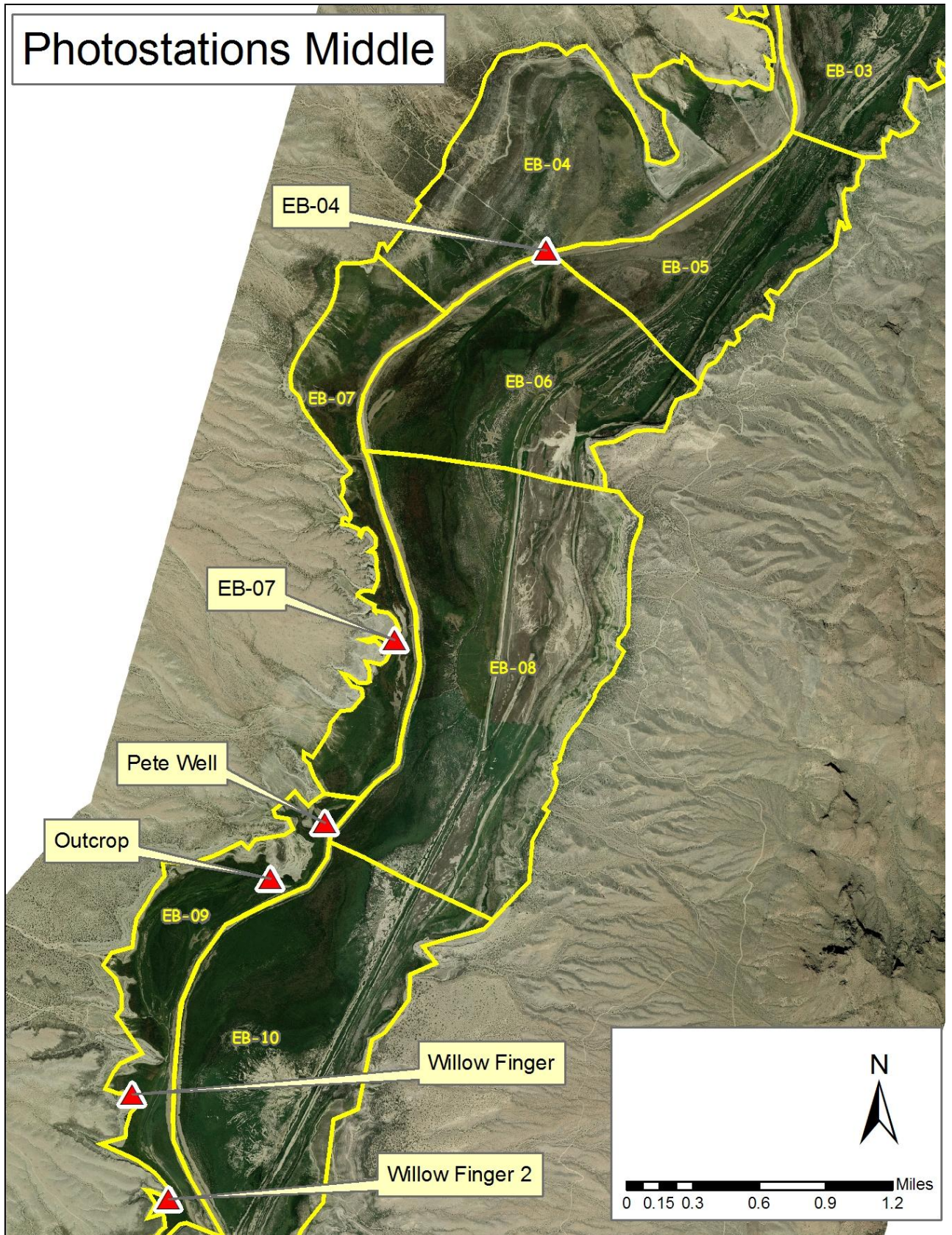


Figure 2. Middle section of photostations in Elephant Butte Reservoir Delta.

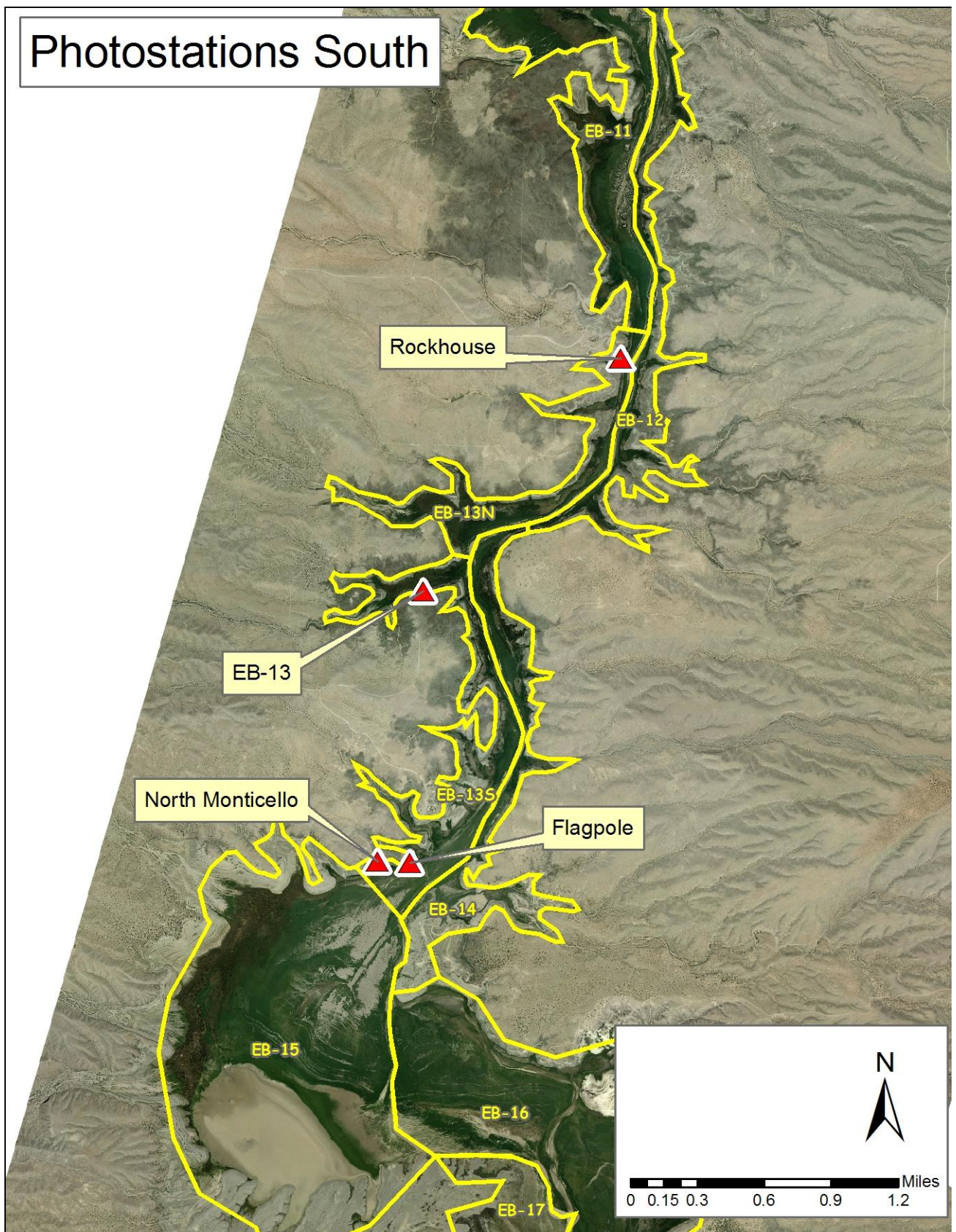


Figure 3. Southern section of photostations in Elephant Butte Reservoir Delta.

Station DL-09 is located approximately 2 miles downstream of Station DL-07. The station is located on the east side of the primary channel and is accessed by crossing a privately constructed foot bridge. Photos were taken at 185° and 230° from the established t-post station. Breeding SWFLs have occupied habitat within 200 meters of this photostation for the past six years.

185° Photos – This site has experienced a fairly significant increase in the density of coyote willow. The Goodding's willow in the background has also continued to develop. The site is subject to flooding when LFCC flows are relatively high – typically in the early spring or during the summer when local thunderstorms augment the LFCC flows. Livestock grazing during the summers of 2006 and 2009 significantly reduced the amount of herbaceous vegetation in the foreground compared to the other three years. SWFLs can often be heard from this location.

230° Photos – The changes shown in these photos are similar to those shown in the 185° photos

Station Confluence is located approximately 1.5 miles downstream of Station DL-09. This station was established in the vicinity of where the LFCC channel flows are diverted into the primary pilot channel of the Rio Grande. Photos were taken at 80°, 120° and 160° from the established t-post station. The Rio Grande pilot channel can be seen flowing left to right in the center of the 2006 photo. These photos were taken to document the succession of the cattail marsh in the foreground.

80° Photos – The development of individual Goodding's willows within the cattail marsh are the most significant changes shown in these photos. Although saltcedar has become established adjacent the access road, it has not spread into the adjacent marsh, likely as a result of unsuitable conditions for establishment.

120° Photos - As natural succession occurs, the Goodding's willow and coyote willow shown in the photos continues to develop. The dead saltcedar (*Tamarix* sp.) in the foreground are remnants of vegetation that had previously been inundated by the reservoir. The dead saltcedar in the center of the photo (on the far side of the Rio Grande pilot channel) was sprayed in late-2003.

160° Photos – These photos also illustrate the natural succession of the site. The cottonwood snag in the center of the photo is a remnant of vegetation that had previously been inundated by the reservoir. These snags provide ideal perch sites for wintering bald eagles (*Haliaeetus leucocephalus*).

Station EB-04 is located adjacent to the Rio Grande pilot channel. The dominant vegetation at this site is saltcedar. By 2007, the access to this site was completely overgrown with saltcedar and was impassable by vehicle. Photos were taken at 70° and 330° from the intersection of the access road and pilot channel berm. The survey marker that was used to mark the station was missing in 2007.

70° and 330° Photos – All photos show the growth and development of saltcedar at the site. The 330° photos clearly illustrate the development of saltcedar; the horizon shown in the 2005 photos is no longer visible by 2007.

Station EB-07 is located approximately one mile upstream of Pete Well Road. These photos show the expansive wetland that has developed along the western edge of the reservoir pool. These wetlands are supported primarily by groundwater flows from the adjacent uplands and a relatively high water table. Slightly higher areas support small stands of developing Goodding's willow. Photos were taken at 130° and 180° from the established t-post station.

130° Photos – The most significant change shown in these photos is the rapid growth and development of Goodding's willow in the foreground. In August 2005, only a few small sprigs of willow can be seen. During the growing seasons of 2006 through 2009, the Goodding's willow developed and currently dominates the foreground. Although the Goodding's willow patches in the background do not currently support breeding SWFLs, the patches do support a relatively large population of YBCUs.

180° Photos – These photos also illustrate the rapid development of Goodding's willow at this site.

Station Pete Well is located near the end of Pete Well Road at the confluence of the access channel and the Rio Grande pilot channel. Photos were taken at 40° and 190° from the established t-post station located on the berm adjacent the access channel.

40° Photos – The Goodding's willow shown in this photo were fairly well established in 2005 when the first photos were taken. However, the patch continued to mature and was once believed to support suitable breeding habitat for the SWFL; although SWFLs never actually occupied the site. As shown in the 2008 and 2009 photos the vigor of the Goodding's willow has significantly diminished since 2005. The 2009 photo clearly shows a very stressed patch of willows, presumably due to prolonged flooding. A relatively large population of Big Bend sliders (*Trachemys gaigeae*), a species of concern, inhabits the immediately adjacent wetland and access channel.

190° Photos – These photos were taken in a southerly direction from the station. Although the Goodding's willow in these photos do not exhibit the structure and density as those north of the access channel (i.e. 40° Photos), it is evident that they are continuing to mature within the cattail marsh.

Station Outcrop is located less than one-half mile downstream of Pete Well Road. The vegetation in these photos is supported primarily by groundwater seepage from the adjacent uplands and a relatively high water table. No overbank flooding from the pilot channel typically occurred at this site. The extensive stand of developing Goodding's willow shown in these photos will likely support a substantial population of breeding SWFLs in the near future. The site exhibits all the characteristics of suitable breeding habitat, and a pair of SWFLs established a territory within the site in 2007 – although no

nest was found. A SWFL pair and unpaired male territory were documented in this habitat in 2008. Photos were taken at 130°, 220° and 280° from a rock cairn located on the outcrop.

130° Photos – The Rio Grande pilot channel can clearly be seen in the center of all photos. An abandoned high-flow channel can be observed in the foreground. This channel became abandoned at the time the pilot channel was constructed. The high-flow channel initially narrowed as the adjacent vegetation developed. The site is typically saturated, and surface water is present beneath the Goodding's willow in the foreground during the early spring and much of the summer. During the summers of 2008 and 2009, a breach in the adjacent pilot channel berm allowed water to move through this site and removed or buried much of the cattails, reopening the high flow channel.

220° Photos – As in the 130° photos, the Rio Grande pilot channel is clearly visible in the upper left-hand corner of the 2005 and 2006 photos. These photos also illustrate the expanse of Goodding's willow habitat at this site and evidence of water flowing through the breach in the pilot channel berm in 2008 and 2009

280° Photos – These photos show the far western edge of the reservoir pool from the outcrop. Natural succession of the cattail marsh is shown in the sequence of photos from 2005 to 2009. As the Goodding's willow develops, the extent of cattail marsh is reduced. As noted above, the 2008 and 2009 pilot channel berm breaches also removed a significant portion of cattails.

Station Willow Finger is located approximately 1.5 miles downstream of the Outcrop. A small side-drainage enters Elephant Butte Reservoir at this site. However, flows are infrequent and occur only as a result of heavy localized thunderstorms. No overbank flooding from the pilot channel occurs at this site. However, the 2008 pilot channel berm breach brought water from the Rio Grande through this area. Normally, the vegetation is supported primarily by a relatively high water table and seepage from the adjacent uplands. Photos were taken at 40° and 340° from the established t-post station.

40° Photos – As shown in these photos, the Goodding's willow has developed over the past several years. The patches are relatively small, and are not as dense as the photos may suggest. Although the habitat may not develop into suitable SWFL habitat, it will likely support YBCUs in the future. The August 2006 photo is missing, due to a camera malfunction.

340° Photos – As shown in these photos, the Goodding's willow and saltcedar have both developed over the past four years. The photo illustrates the narrowness of the side drainage, and the absence of sufficient density for breeding SWFLs.

Station Willow Finger Two is located approximately 0.5 miles downstream of Station Willow Finger. A small side-drainage also enters Elephant Butte Reservoir at this site. However, flows are infrequent and occur only as a result of heavy localized thunderstorms. No overbank flooding from the pilot channel occurs at this site. The

vegetation is supported primarily by a relatively high water table and seepage from the adjacent uplands. Photos were taken at 150° and 240° from the established t-post station.

150° Photos – A native community of Goodding's willow and coyote willow dominate this site. However, the site is relatively dry and lacks the proper structure and density for breeding SWFLs. The August 2006 photo is missing, due to a camera malfunction. The photos show the increase in height of the vegetation at this site between 2005 and 2009.

240° Photos – A native community of Goodding's willow surrounds a cattail marsh in this photo. Although this wetland provides important habitat for a number of riparian obligate species, it lacks the proper structure and density for breeding SWFLs. The August 2006 photo is missing, due to a camera malfunction.

Station Rockhouse is located within the Narrows of Elephant Butte Reservoir. Although the vegetation is relatively dense, the patch is quite narrow. Photos were taken at 0° and 100° from the established t-post station. No overbank flooding from the pilot channel occurs at this site. The patches of vegetation are very linear in shape due to the confines of the Narrows. The Narrows of Elephant Butte Reservoir likely supports one of the largest known populations of YBCUs in the Southwest. In 2008, a population of SWFLs, including nine territories became established within Goodding's willow habitat in the southern end of the Narrows. In 2009, the population of SWFLs within the Narrows expanded to 22 territories.

0° Photos – This site is also dominated by Goodding's willow; with saltcedar on the drier periphery. In, 2009, three SWFL territories were established within 250 meters of this station. Although the vegetation is relatively dense, the patches are generally less than 15-20 meters in width.

100° Photos – Sparse stands of Goodding's willow and saltcedar have encroached on the drying cattail marsh. As previously stated, no overbank flooding from the pilot channel occurs at this site. The pilot channel is somewhat incised and serves as a drain due to the confines of the Narrows, further lowering the adjacent water table.

Station EB-13 is located adjacent to a large side drainage to Elephant Butte Reservoir within the Narrows. No overbank flooding from the pilot channel occurs at this site and the site is generally relatively dry. However, evidence of recent high flows exist as a result of heavy localized thunderstorms. Fluctuating reservoir levels during the summers of 2008 and 2009 resulted in limited flooding within portions of the adjacent site. The downstream portion of the side drainage supports a maturing stand of Goodding's willow. Breeding YBCUs have been confirmed at this site. In 2007 and 2008, breeding YBCUs were captured and affixed with radio transmitters to track their movements and habitat use within the site. In 2008, two unpaired male SWFL territories (possibly late migrants) were documented within habitat adjacent to this photostation. Photos were taken at 45° and 290° from the established t-post station overlooking the drainage. In 2009, one SWFL territory was documented just upstream of this station.

45° Photos – These photos show the downstream portion of the drainage and the developing stands of Goodding's willow. The pilot channel flows perpendicular to the drainage and behind the outcrop in the center of the photo. The high water mark of Elephant Butte Reservoir is clearly seen on this outcrop. YBCUs can often be heard from this point. Suitable SWFL and YBCU breeding habitat is present in the immediate vicinity.

290° Photos – These photos show the upstream portion of the side drainage. The Goodding's willow which dominates this site has matured significantly in the past four, and may present sufficient structure for breeding SWFLs in the near future. The site is relatively dry, and the last remnants of the cattail marsh shown in the 2005 photos have been almost entirely replaced by Goodding's willow. The cottonwood tree in the lower righthand corner of the photo contained an active YBCU nest during the summer of 2007.

Station Flagpole is located near the mouth of the Narrows as the pilot channel flows into a broader portion of Elephant Butte Reservoir - Monticello Bay. No overbank flooding occurs in this area, and much of the site remained dry during the 2005-2007 period due to the pilot channel which flows through the center of the Narrows. As the reservoir elevation increased during the spring and summer of 2008 and 2009, reservoir water entered this area. A mix of Goodding's willow, coyote willow, saltcedar and seep willow (*Baccharis* sp.) are established at this site. Photos were taken at 50°, 140° and 150° from the established t-post station, overlooking the drainage.

50° Photos – These photos were taken looking upstream through the Narrows. Native Goodding's willow and coyote willow dominate this portion of the site. The vegetation has matured over the past four years and currently supports breeding SWFLs and YBCUs. In 2008, four SWFL territories were documented within 500 meters of this photostation. In 2009, 18 SWFL territories were documented between Station Flagpole and Station EB-13.

140° Photos - These photos were taken looking downstream near the mouth of the Narrows. Relatively young Goodding's willow, coyote willow, saltcedar, and seep willow can be seen in the background. This vegetation would be the first to be inundated by a rising reservoir and was flooded during rising reservoir elevations in 2008 and 2009. The vegetation is sparse, and does not support YBCUs or SWFLs.

150° Photos – The 150° photo taken from the Flagpole Station was first established in August 2007 to document the current reservoir elevation. Elephant Butte Reservoir can be seen in the background. A portion of the site, in the center of the photograph, has been subject to inundation within the past 2-3 years. The reservoir level rose significantly during 2008 but, unfortunately, this photo was omitted from the 2008 and 2009 photography.

Station North Monticello is the most southern (i.e. downstream) station established. The photographs document the vegetation within Monticello Bay of Elephant Butte Reservoir. The vegetation in the foreground became established as the reservoir began to

recede. The patch of Goodding's willow in the foreground was utilized as a source of cuttings used for pole plantings in 2004. Many of the Goodding's willows resprouted from the cut stumps, and appeared fully recovered by 2007. No obvious adverse impacts are readily visible as a result of the pole cuttings. Photos were only taken at a bearing of 190°. In the 2005 photo, younger age class saltcedar and willows can be seen in the background. During the following four years, vegetation in the foreground matured to obscure the background vegetation. Much of the vegetation in this area has been subject to periodic flooding within the past 2-4 years. Photos were taken from an established t-post.

Appendix A

UTM Coordinates and Bearings for Elephant Butte Reservoir Delta Photostations

NAD 83 Datum, Zone 13 N - Stations marked by T-post or cairn

STATION NAME	UTM COORDINATES		BEARING(S)
DL-07	E306003	N3715500	80° and 150°
DL-09	E304741	N3713449	230° and 185°
Confluence	E304059	N3711223	80°, 120°, and 160°
EB-04	E300962	N3705920	70° and 330°
EB-07	E299863	N3703089	130° and 180°
Pete Well	E299354	N3701756	40° and 190°
Outcrop	E298960	N3701353	130°, 280°, and 220°
Willow Finger	E297953	N3699783	40° and 340°
Willow Finger Two	E298219	N3699022	150° and 240°
Rockhouse	E298613	N3695710	0° and 100°
EB-13	E297187	N3694010	45° and 290°
Flagpole	E297088	N3692022	50°, 140°, and 150°
North Monticello	E296855	N3692032	190°

Appendix B

Photostation photos from 2005 through 2009

DL-07 ----- 80 degrees

August 2005



DL-07 ----- 80 degrees

August 2006



August 2007



September 2008



DL-07 ----- 80 degrees (Continued)

August 2009



DL-07 ----- 150 degrees

August 2005



August 2007



DL-07 ----- 150 degrees

August 2006



September 2008



DL-07 ----- 150 degrees (Continued)

August 2009



DL-09----- 185 Degrees

August 2005



DL-09 ----- 185 Degrees

August 2006



August 2007



September 2008



DL-09 ----- 185 Degrees (Continued)

August 2009



DL-09 ----- 230 degrees

August 2005



DL-09 ----- 230 degrees

August 2006



August 2007



September 2008



DL-09 ----- 230 degrees (Continued)

August 2009



Confluence ----- 80 degrees

August 2005



Confluence ----- 80 degrees

August 2006



August 2007



September 2008



Confluence ----- 80 degrees (Continued)

August 2009



Confluence ----- 120 degrees

August 2005



Confluence ----- 120 degrees

August 2006



August 2007



September 2008



Confluence ----- 120 degrees (Continued)

August 2009



Confluence ----- 160 degrees

August 2005



Confluence ----- 160 degrees

August 2006



August 2007



September 2008



Confluence ----- 160 degrees (Continued)

August 2009



EB-04 -----70 degrees

August 2005



EB-04 -----70 degrees

August 2006



August 2007



September 2008



EB-04 ----- 70 degrees (Continued)

August 2009



EB-04 ----- 330 degrees

August 2005



EB-04 ----- 330 degrees

August 2006



August 2007



September 2008



EB-04 ----- 330 degrees (Continued)

August 2009



EB-07 ----- 130 degrees

August 2005



EB-07 ----- 130 degrees

August 2006



August 2007



September 2008



EB-07 ----- 130 degrees (Continued)

August 2009



EB-07 ----- 180 degrees

August 2005



EB-07 ----- 180 degrees

August 2006



August 2007



September 2008



EB-07 ----- 180 degrees (Continued)

August 2009



Pete Well ----- 40 degrees

August 2005



August 2007



Pete Well ----- 40 degrees

August 2006



September 2008



Pete Well ----- 40 degrees (Continued)

August 2009



Pete Well ----- 190 degrees

August 2005



Pete Well ----- 190 degrees

August 2006



August 2007



September 2008



Pete Well ----- 190 degrees (Continued)

August 2009



Outcrop ----- 130 degrees

August 2005



Outcrop ----- 130 degrees

August 2006



August 2007



September 2008



Outcrop --- 130 degrees (Continued)

August 2009



Outcrop ----- 220 degrees

August 2005



Outcrop ----- 220 degrees

August 2006



August 2007



September 2008



Outcrop ----- 220 degrees (Continued)

August 2009



Outcrop ----- 280 degrees

August 2005



Outcrop ----- 280 degrees

August 2006



August 2007



September 2008



Outcrop ----- 280 degrees (Continued)

August 2009



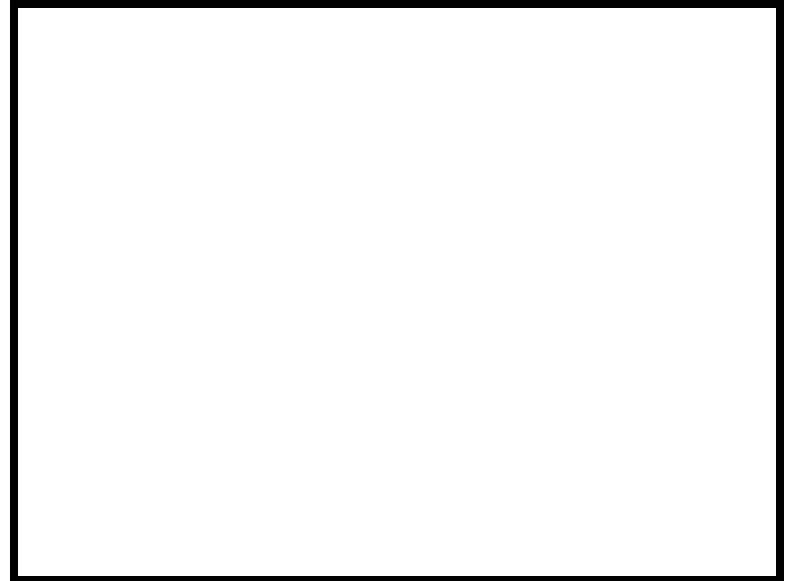
Willow Finger ----- 40 degrees

August 2005



Willow Finger ----- 40 degrees

August 2006 - **MISSING**



August 2007



September 2008



Willow Finger ----- 40 degrees (Continued)

August 2009



Willow Finger ----- 340 degrees

August 2005



Willow Finger ----- 340 degrees

August 2006



August 2007



September 2008



Willow Finger ---- 340 degrees (Continued)

August 2009



Willow Finger Two ----- 150 degrees

August 2005



August 2007



Willow Finger Two ----- 150 degrees

August 2006 - MISSING



September 2008



Willow Finger Two ----- 150 degrees (Continued)

August 2009



Willow Finger Two ----- 240 degrees

August 2005



August 2007



Willow Finger Two ----- 240 degrees

August 2006 - MISSING



September 2008



Willow Finger Two ----- 240 degrees (Continued)

August 2009



Rockhouse ----- 0 degrees

August 2005



August 2007



Rockhouse ----- 0 degrees

August 2006



September 2008



Rockhouse ----- 0 degrees (Continued)

August 2009



Rockhouse ----- 100 degrees

August 2005



August 2007



Rockhouse ----- 100 degrees

August 2006



September 2008



Rockhouse ----- 100 degrees (Continued)

August 2009



EB-13 ----- 45 degrees

August 2005



August 2007



EB-13 ----- 45 degrees

August 2006



September 2008



EB-13 ----- 45 degrees (Continued)

August 2009



EB-13 ----- 290 degrees

August 2005



EB-13 ----- 290 degrees

August 2006



August 2007



September 2008



EB-13 ----- 290 degrees (Continued)

August 2009



Flagpole ----- 50 degrees

August 2005



August 2007



Flagpole ----- 50 degrees

August 2006



September 2008



Flagpole ----- 50 degrees (Continued)

August 2009



Flagpole ----- 140 degrees

August 2005



Flagpole ----- 140 degrees

August 2006



August 2007



September 2008



Flagpole ----- 140 degrees (Continued)

August 2009



Flagpole ----- View of Reservoir Pool ----- 150 degrees

August 2007 (Established 2007)



Flagpole ----- View of Reservoir Pool ----- 150 degrees

August 2008 **MISSING**



September 2009 - **MISSING**



North Monticello ----- 190 degrees

August 2005



August 2007



North Monticello ----- 190 degrees

August 2006



September 2008



North Monticello ----- 190 degrees (Continued)

August 2009

